Higher Education Solar Development: Policy Issues

Smart and Sustainable Campuses Conference

April 5, 2016

EPA GREEN POWER PARTNERSHIP

Speakers and Agenda

- Speakers
  - James Critchfield, EPA Green Power Partnership
  - Lori Bird, National Renewable Energy Laboratory (NREL)
- Agenda
  - Introduction to Green Power Partnership
  - Background on today's workshop
  - Policy Issues Presentation
  - Brief Survey Request
  - Questions and Answer Session

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Green Power Partnership Overview

- Summary
  - The U.S. EPA's Green Power Partnership (GPP) is a free, voluntary program that encourages organizations to use green power as a way to reduce the environmental impacts associated with conventional electricity use.
- Objectives
  - Reduce emissions and air pollution
  - Expand the voluntary green power market
  - Standardize green power procurement as part of best practice environmental management
  - Provide recognition platform for organizations using green power in the hope that others follow their lead
- Current Status
  - 1,300 Partners using more than 31 billion kWh of green power annually, equivalent to the electricity use of more than three million average American homes.

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Partner Snapshot

Current Status

- EPA's Green Power Partnership
  - 134 College and University Partners
    - 81 REC contracts
    - 62 Utility supply contracts
    - 86 onsite solar systems (35,554,856 kWh, 77 owned, 9 through PPAs)
    - 13 off-site PPAs
  - Green power use totaling nearly 2.7 billion kWh
    - Equates to nearly 4% of the voluntary green power market (8.5% of the green power used by Green Power Partners)
    - Equivalent to the annual electricity use of 245,000 average American homes

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WHY FOCUS ON SOLAR IN HIGHER EDUCATION

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Why Higher Education?

- Higher Education offers great potential:
  - **Homogenous cohort** of identifiable stakeholders
  - Long time and **respected pillars of local communities**
  - **Long-term view** on energy and sustainability issues
  - **Public commitments** of nearly 700 College and University Presidents to do more related to climate and RE
  - Clearly **identifiable set of financing options** including, third-party ownership, revolving loan funds, endowments, student funded initiatives etc.
  - **Tie-ins to educational mission**; training tomorrow's leaders regarding sustainability and renewable energy issues and opportunities
  - Natural **inter-institutional competitive spirit** in the areas of academia and college sports can be extended to and leveraged into solar energy use

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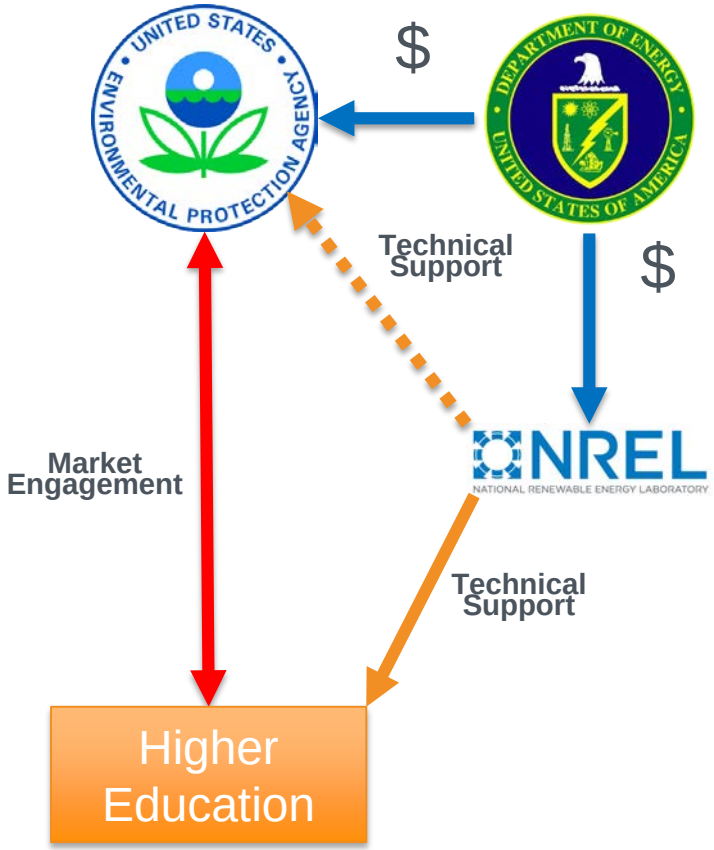
Federal Focus

- Collaboration is born out of a joint effort between EPA, DOE and the National Renewable Energy Lab to focus on mid-scale solar opportunities
- EPA role is to convene stakeholders, facilitate networking opportunities and disseminate both new and existing resources in an effort to address market barriers
- The National Renewable Energy Laboratory (NREL), funded through a DOE SETO SUNLAMP award, will provide technical support to EPA on tools and resources development, engagement and deployment activities undertaken through this initiative



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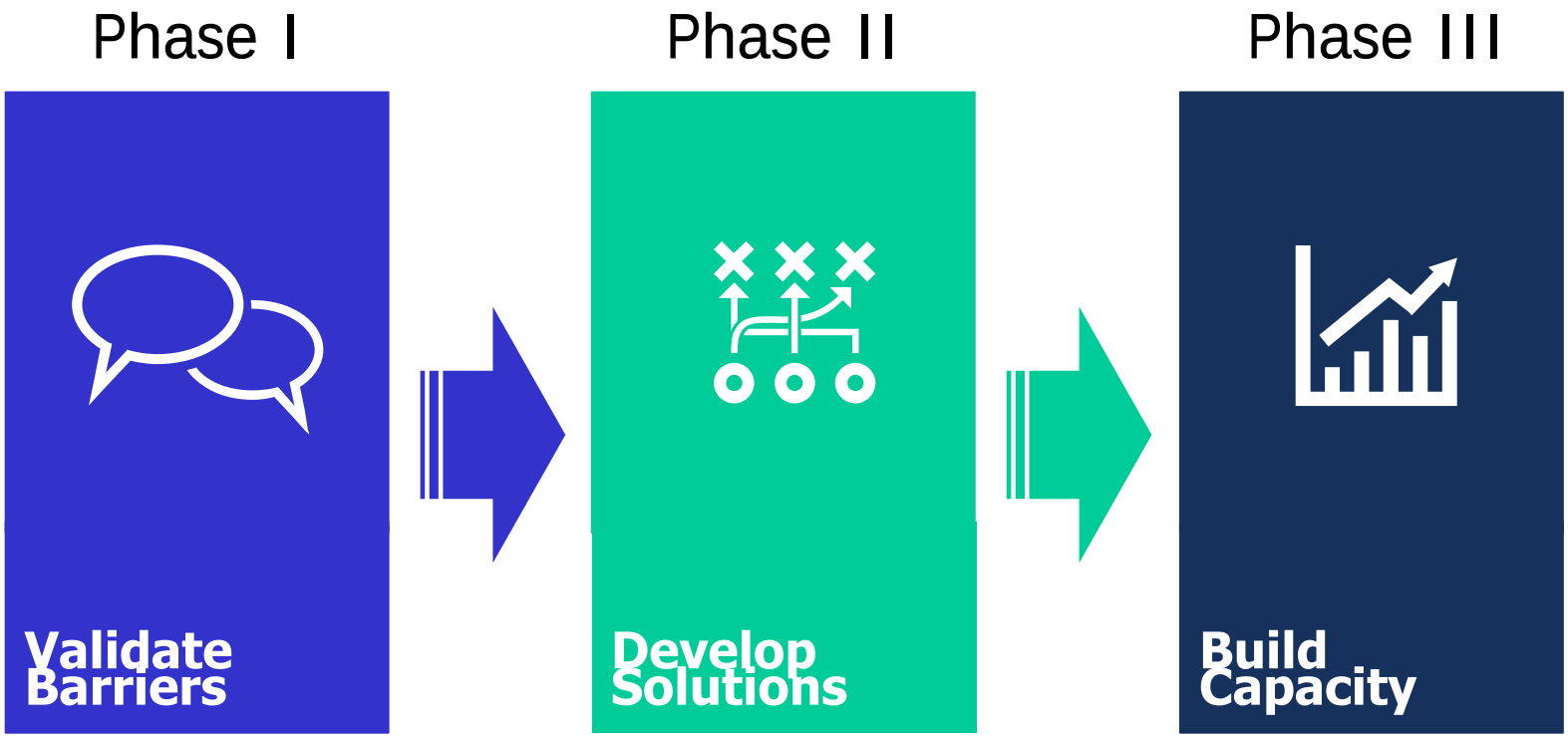
EPA's 18-month Approach



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Today's Objectives

- Discuss and identify common project development barriers unique to on- and off-campus solar project opportunities at institutions of higher education
- Validate solar development needs of individual attendees
- Exchange information related to individual experiences and practices
- Identify, discuss and provide technical and non-technical solutions to common barriers

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Down the Road

- EPA will disseminate solutions, tools, and resources to stakeholders on specific barriers or issue areas over next 18-months
  - Online Resource Directory
  - Basic information and guidance
  - Trainings
  - Templates
  - Case Studies
  - Tools

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Higher Education Solar Development: Policy Issues

Lori Bird, NREL

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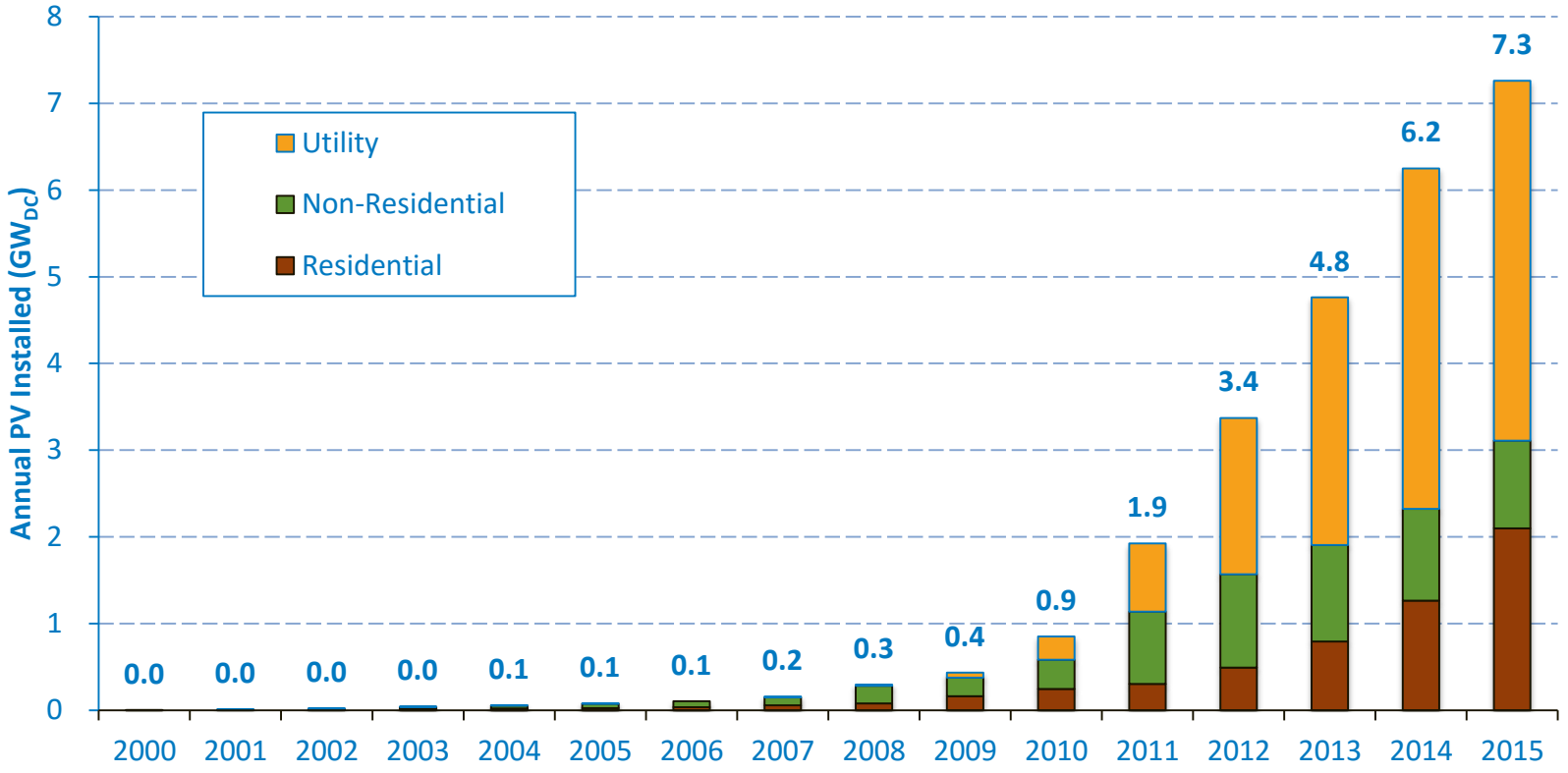
Overview

1. **Brief Solar Market Overview**
2. **U.S. Investment Tax Credit and State Financial Incentives for Solar**
    1. Implications for Power Purchase Agreements and 3rd Party Owned Systems
3. **Renewable Portfolio Standards and SREC Markets**
4. **Net Metering and Interconnection Issues**
5. **Conclusions**

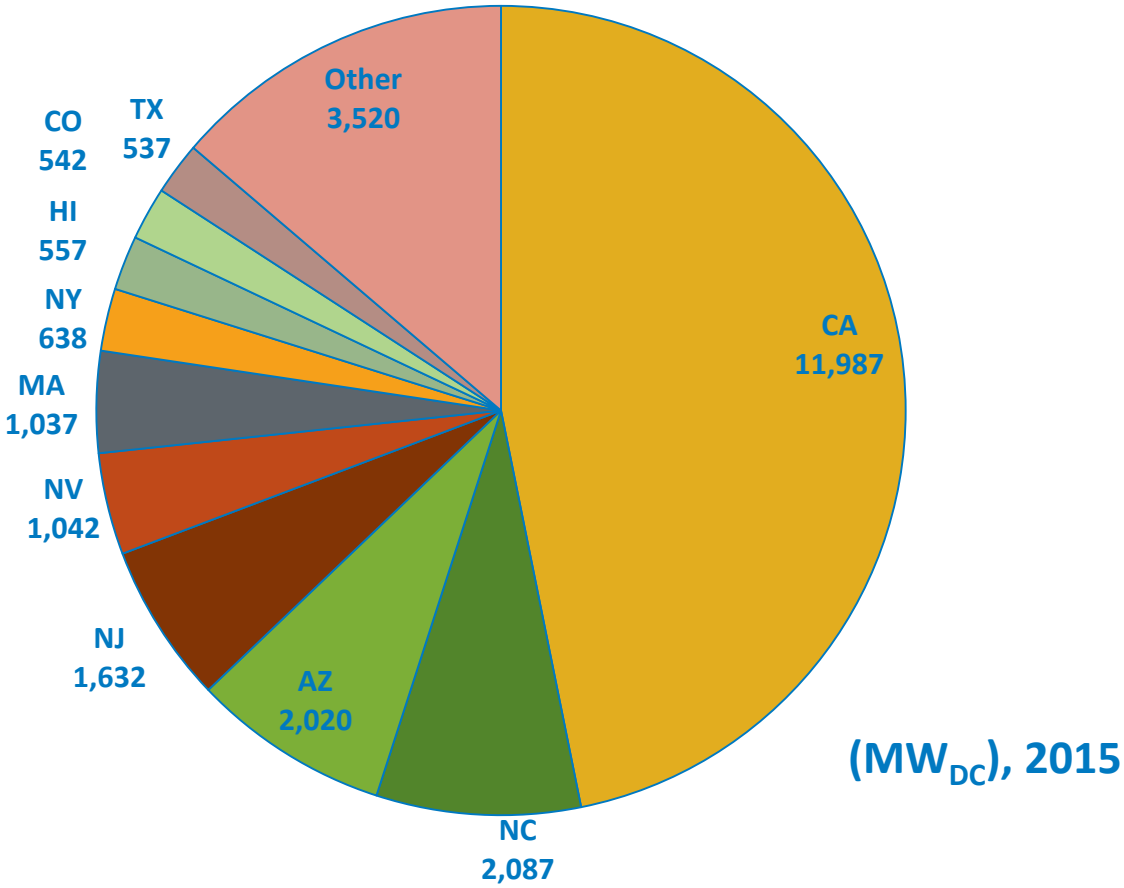
U.S. PV Installations by Market Segment



- **The U.S. installed 7.3 GW in 2015, up 16% over 2014 – and 8.5 times greater than in 2010**
- **Total U.S. PV capacity reached 25.6 GW**

Source: GTM Research & SEIA. "U.S. Solar Market Insight: 2015 Year-in-Review." March 2016.

U.S. PV Cumulative Installations by State

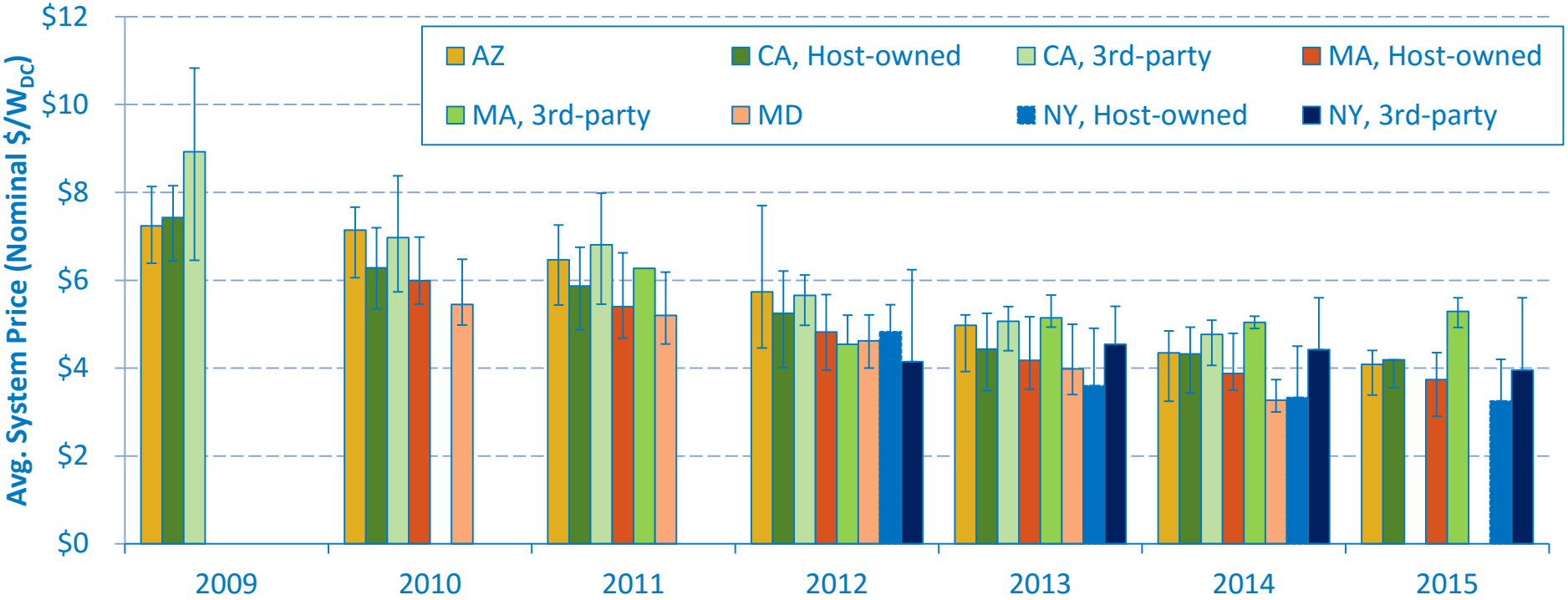


(MW_{DC}), 2015

PV installations today concentrated in about 10 states with leading markets

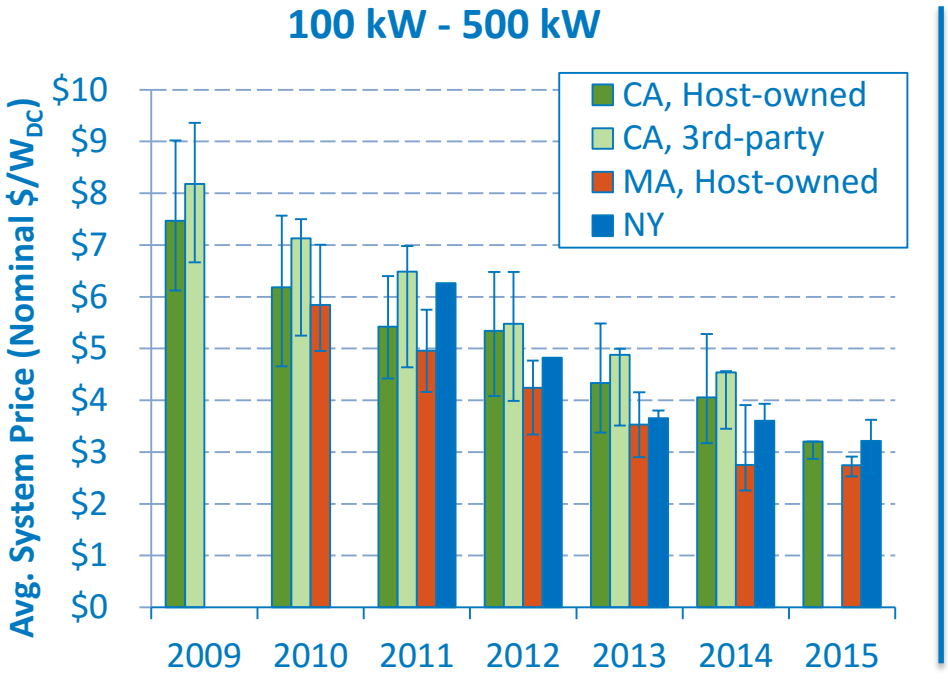
Average System Pricing by Size & Region

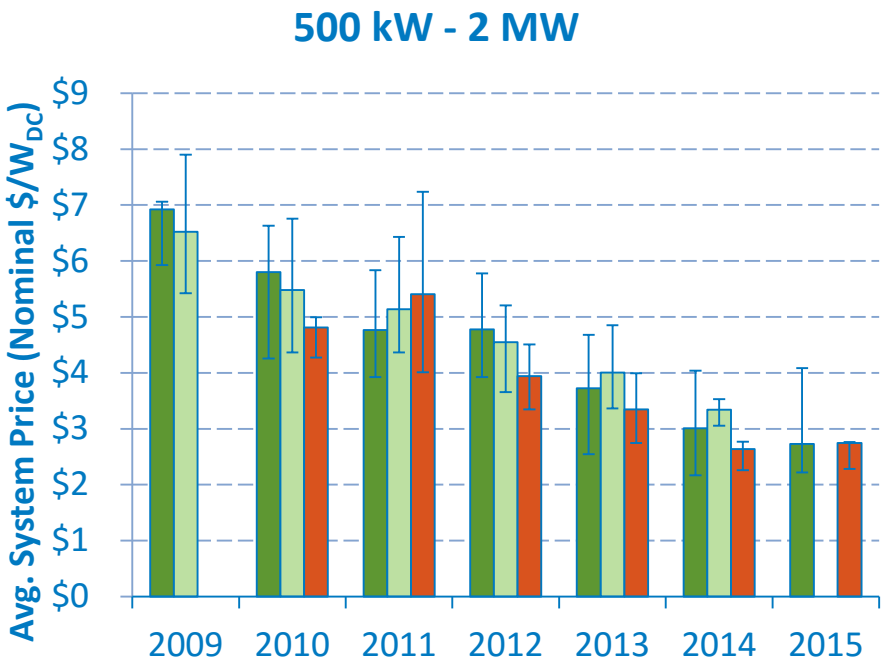
10 kW – 100 kW



- **Systems pricing (10 kW – 100 kW) fell on average 13% between 2014-15, and has fallen on average 10% since 2009 in the above jurisdictions**
- **System pricing in the 20th percentile ranges between $2.9-$4.9/W depending on jurisdiction**
- **With the exception of NY, 3rd-party systems are reporting higher prices, but a tighter range than host-owned systems**

Average System Pricing by Size & Region





- System pricing (100 kW – 500 kW) fell on average 16% between 2014-15, and has fallen on average 13% since 2009 in the above jurisdictions
- System pricing (500 kW – 2 MW) fell on average 4% between 2014-15, and has fallen on average 17% since 2009 in the above jurisdictions
- 20% percentile of host owned systems in CA & MA (500 kW – 2 MW) was $2.22/W & $2.28/W respectively for 2015

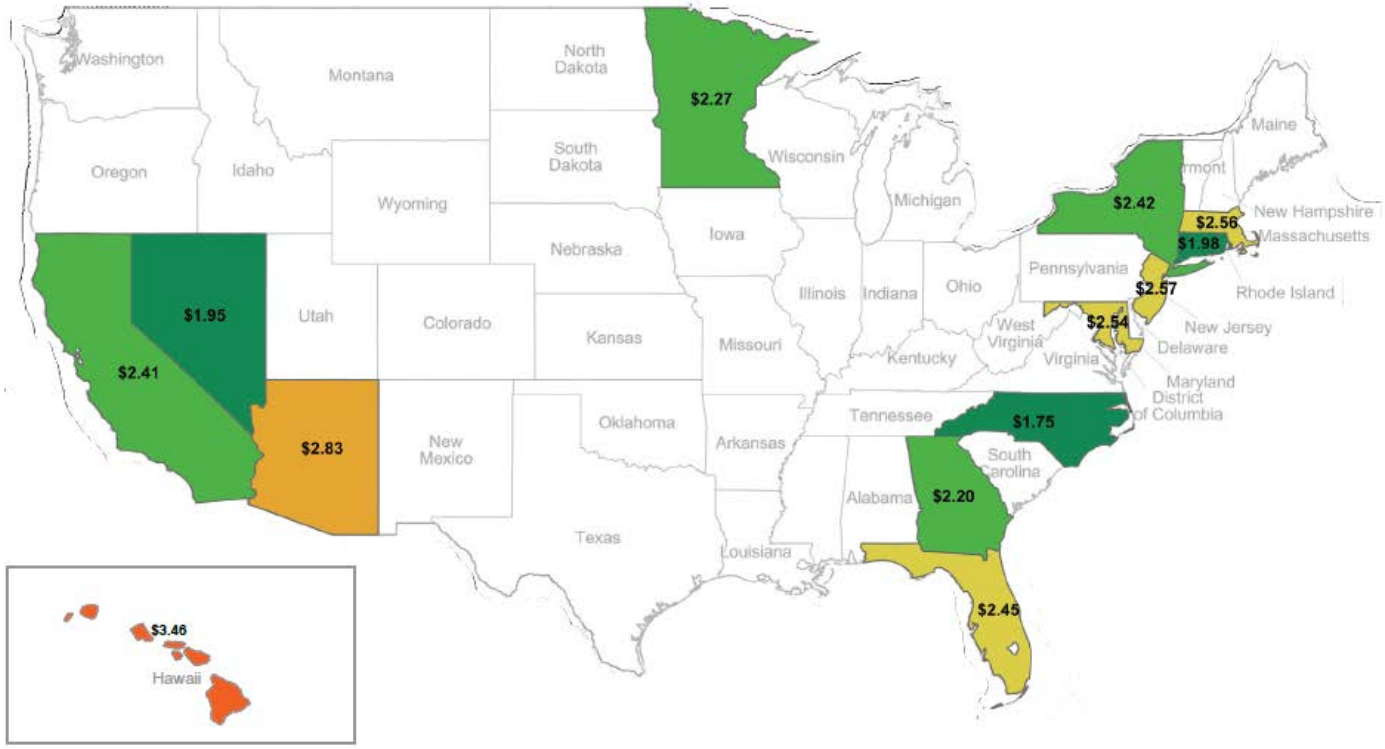
Note: Error bars represent 20/80th percentile.

Sources: CSI Database, CA Interconnection Data accessed 01/07/15; MA SREC Program, accessed 01/07/16; Arizona Public Service, accessed 01/14/16; NY PV Incentive Program, accessed 01/15/16.

Non-Residential System Prices from Mercatus

- Mercatus reported 2015 average U.S. non-residential rooftop costs of $2.45/W
  - 2015 interconnection costs for non-residential and utility-scale systems reported to be $0.01/W for rooftop and $0.06/W for ground-mount
  - Development costs reported between $0.02/W-$0.04/W

Average non-residential rooftop cost by state, 2015



Source: SEPA, "Photovoltaic System Quotes from Selected States 2014-15."

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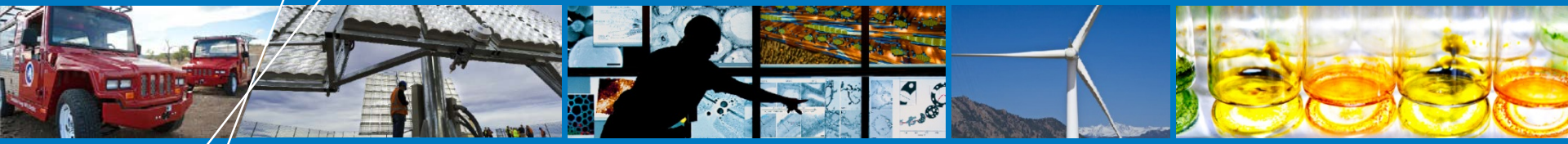
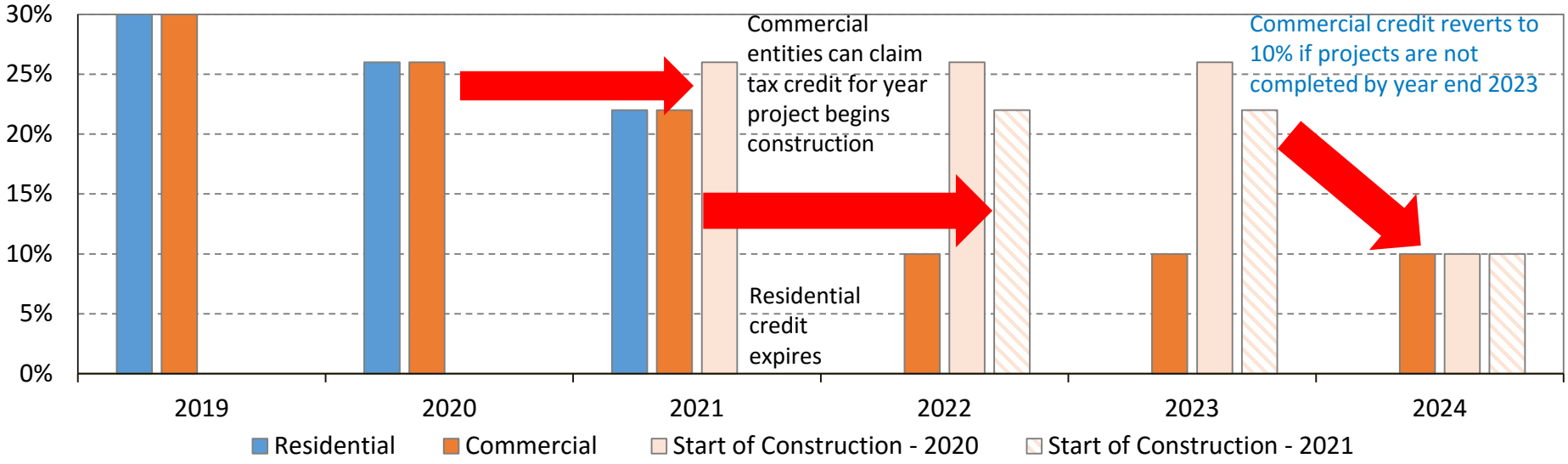


Federal and State Financial Incentives for Solar

Federal Investment Tax Credit (ITC) Extension



- **5-year ITC renewal in *Consolidated Appropriations Act, 2016 (HR 2029)***
- **The 30% credit was extended through 2020, and will step down through 2022. Bill changes deadlines from "placed in service" to "start of construction" for projects placed in service before 2024.**
  - 26% in 2020
  - 22% in 2021, and
  - 10% in 2022 for commercial systems

Source: Consolidated Appropriations Act, 2016 (H.R. 2029).

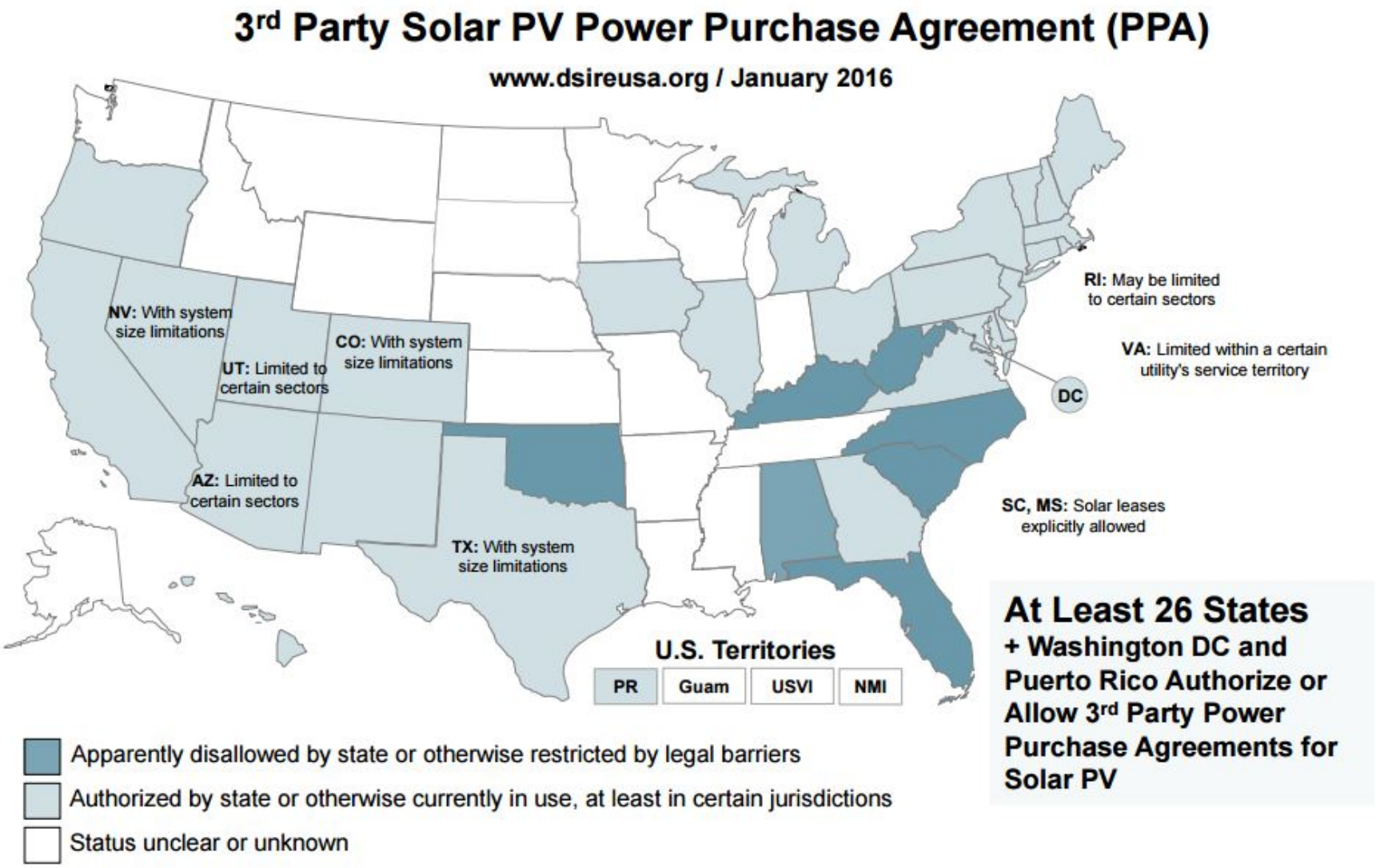
Accelerated Depreciation (MACRS)

- **5 year modified accelerated cost recovery system (MACRS)**
- **Businesses can deduct ITC eligible property costs over 5-year schedule, reducing taxable income**
  - If ITC is claimed, eligible property is reduced by ½ of the credit (i.e., 30% ITC means 85% of eligible property)
  - MACRS provides tax benefit equal to about 26% of system costs on NPV basis (compared to 14% for 20 yr straight line depreciation)
- **H.R. 2029 adds bonus depreciation of projects placed in service 2015-2020, enabling higher depreciation basis in year 1**
  - Projects placed in serve between 2015-2018, can depreciate 50% of their basis in first year
  - Projects placed in service in 2019, 40%
  - Projects placed in service in 2020, 30%

ITC Implications and 3rd Party Ownership

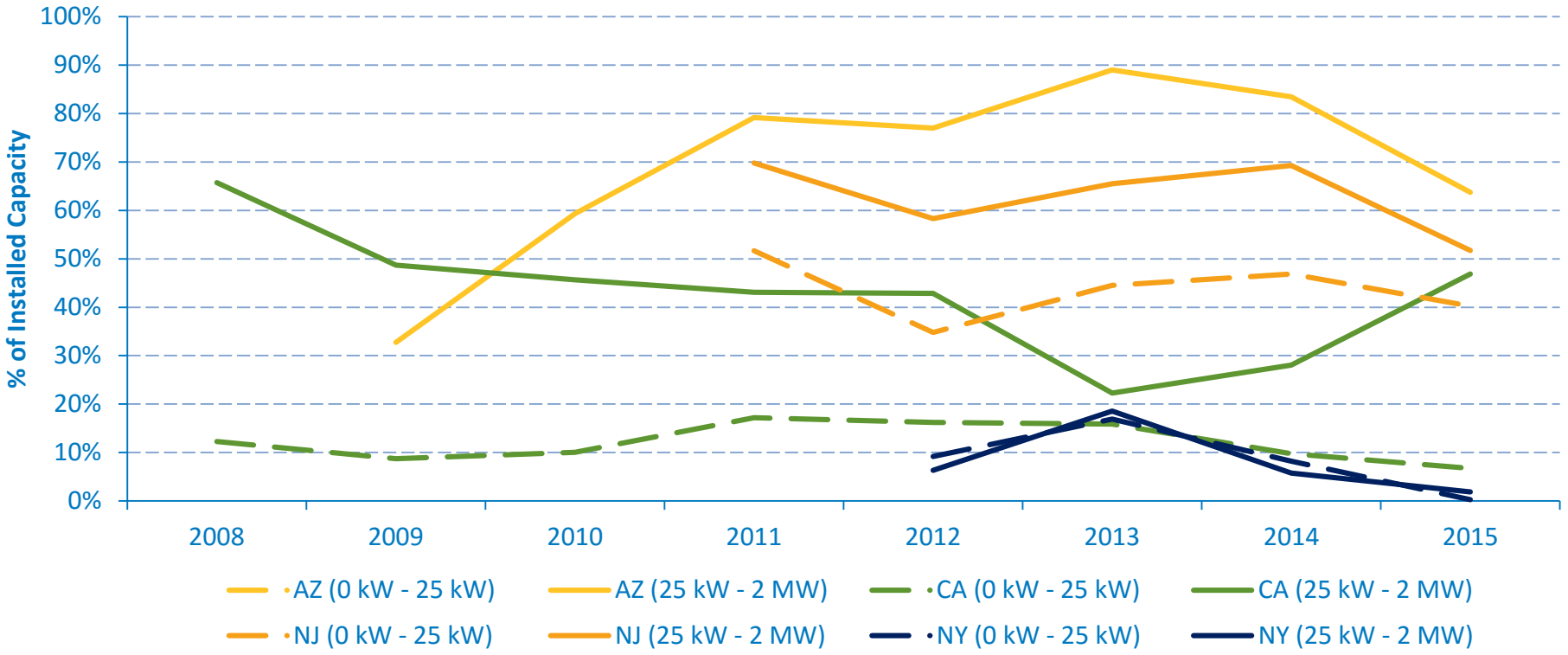
- **For entities who cannot take advantage of tax credits, 3rd party-owned systems are option**
- **Other potential advantages of 3rd party ownership:**
  - Can be cash flow positive earlier than owned systems; predictable cost of energy over 15-20 years
  - O&M, design, and permitting is responsibility of 3rd party
  - Risk of under-generation is on 3rd party
  - Contracts with 3rd party are not on balance sheet; long term liability of contract does not count toward any limits on the amount of debt a company can incur
- **Some states prohibit power purchase agreements (PPAs) with 3rd parties**
  - Concern is about definition of a "utility" and unregulated entities selling power

State Policies Regarding 3rd Party PPAs



Source: DSIRE database

Commercial 3rd-Party System Ownership by Region



- 3rd-party ownership in the commercial market varies by region and system size
  - Host ownership of systems continues to increase in most markets

2014 MW: (0 kW – 25 kW) AZ (30), CA (1.4), NJ (0.5), NY (1). (25 kW – 2 MW) AZ (16), CA (46),NJ (27), NY (6).

Note: Data is weighted by capacity.

Sources: CSI Database, accessed 01/07/16; Arizona Public Services, & Salt River Project, accessed 01/14/16; NJCEP, accessed 01/15/16.

State Financial Incentives for Solar

- **Direct Incentives**
  - Production-base Incentives (based on system performance and output)
  - Rebates
  - In some jurisdictions, these have been phased out
- **Tax Credits**
- **Low-Interest Loans**
- **Sales Tax Exemptions**
- **Property Tax Incentives**
- **Property Assessed Clean Energy (PACE) Financing**

For more information see: http://www.dsireusa.org/

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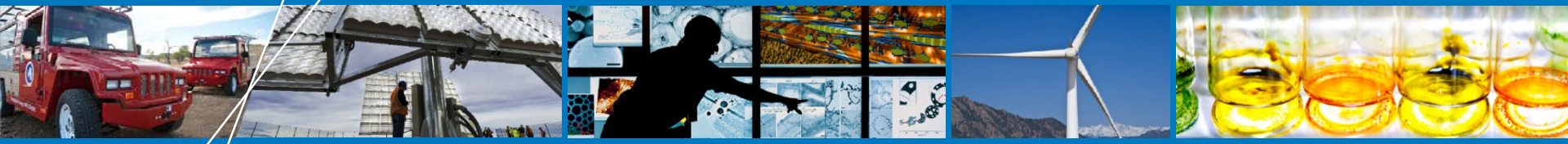
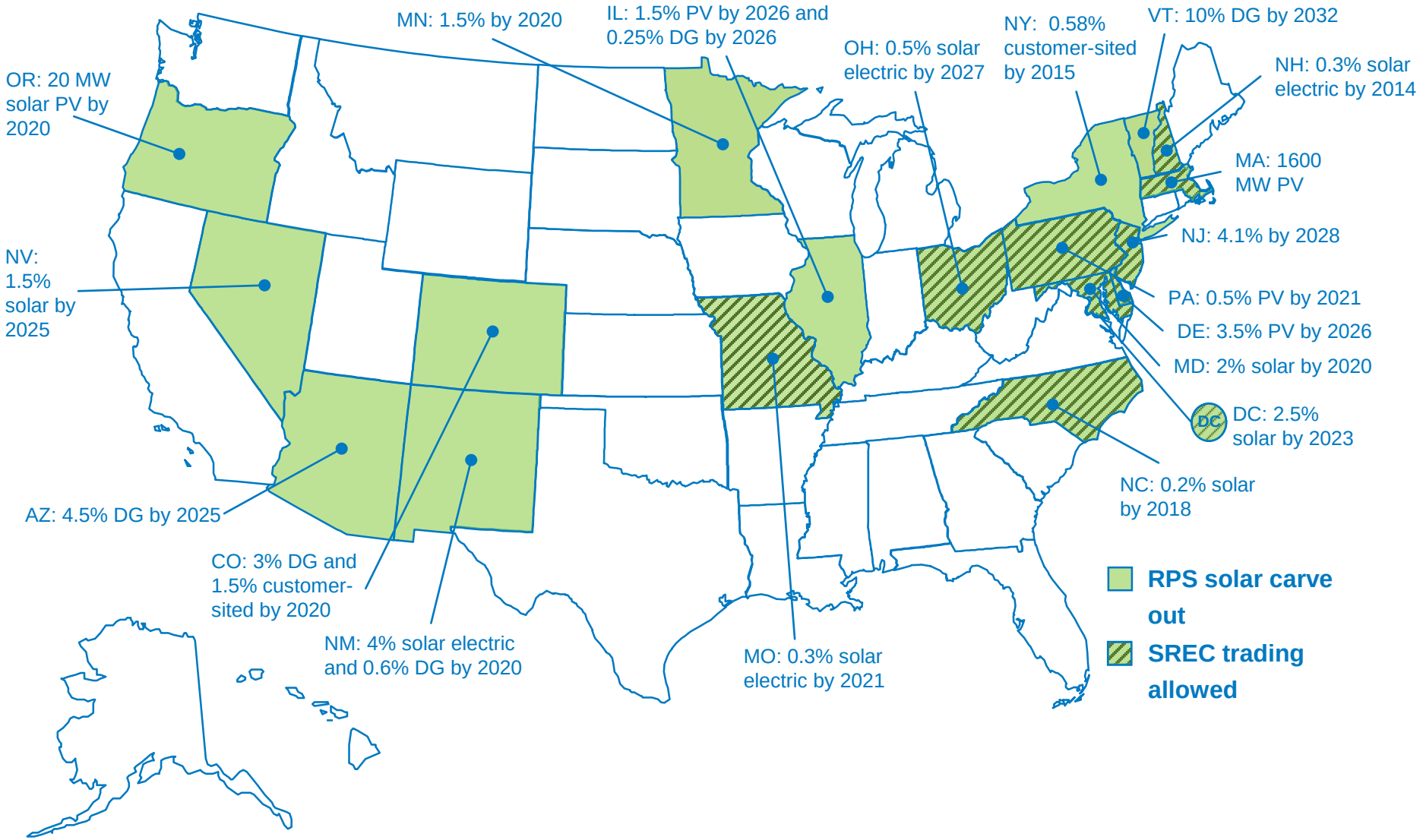


Renewable Portfolio Standards and SREC Markets

19 Jurisdictions Have RPS with Solar or DG Carve Out



Understanding SREC Markets

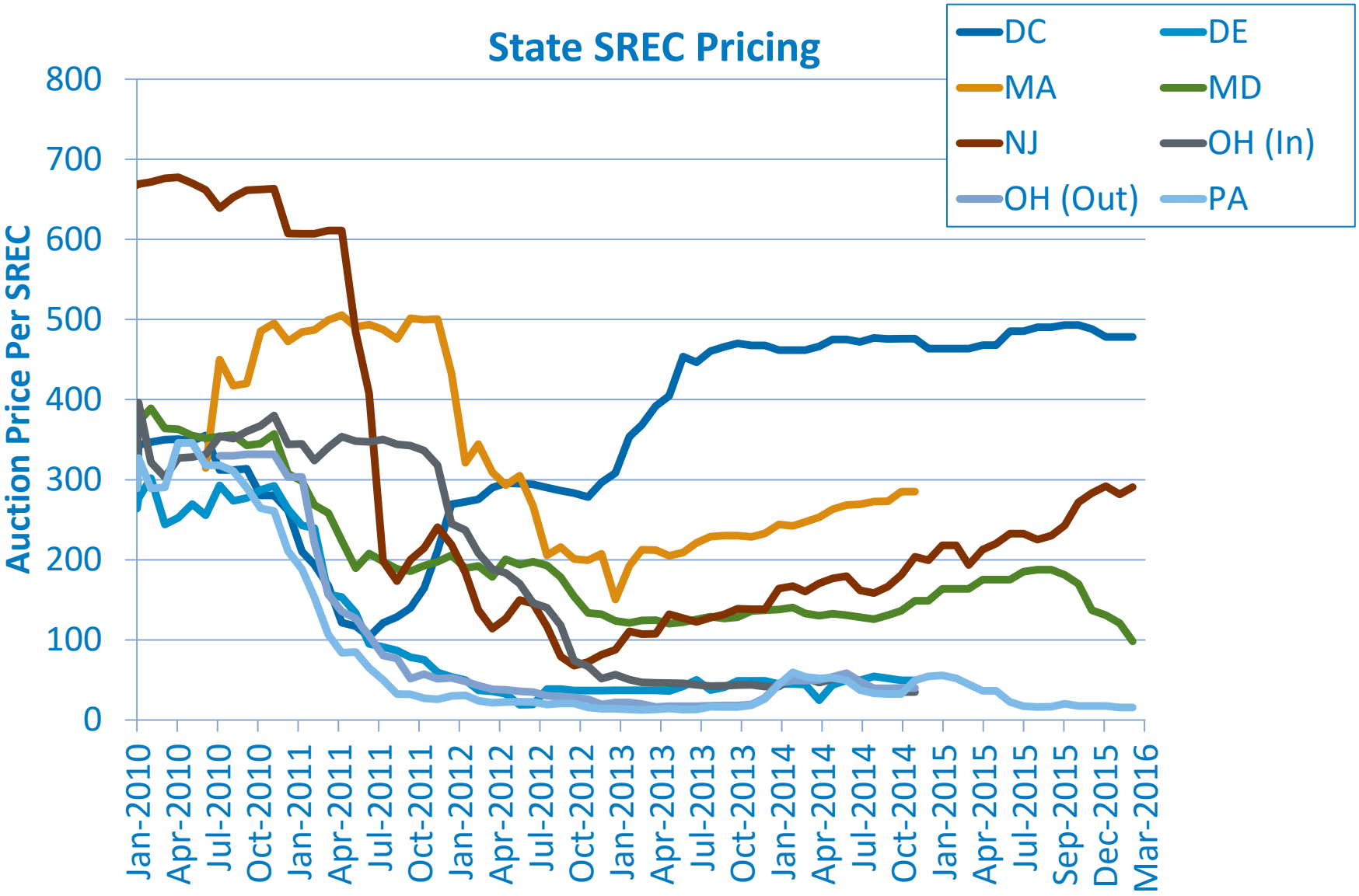
- **In some states, projects can sell SRECs to entities who need to meet RPS requirements**
- **Prices vary based on supply and demand in the SREC markets – each state is different**
- **Rules vary, but generally SRECs must come from the state or region**
- **Alternative Compliance Payment (ACP) exist in some states and serve as a cap on SREC prices**
  - Entities obligated to meet RPS can pay the ACP instead of purchasing SRECs on the market
  - Often these are set to decline over time
- **Generally, little to no market for SRECs outside of these state markets**

Summary of SREC State Policies

State	Solar carve-out	2016 ACP	End-year ACP	2015 Installed capacity (MW)
Delaware	3.5% by 2026	$400	$400	70
District of Columbia	2.5% by 2023	$500	$50	17
Maryland	2% by 2020	$350	$150	366
Massachusetts	1,600 MW	$350	$244 (in 2025)	1037
New Hampshire	0.3% by 2014	$55.72	Adjusted annually by ½ of CPI	23
New Jersey	4.1% by 2028	$323	$239	1632
Ohio	0.5% by 2027	$300	$50	113
Pennsylvania	0.5% by 2021	$188 (2014)	TBD	258

Installed capacity data are from SEIA/GTM (2016). U.S. Solar Market Insight: 2015 Year in Review

State SREC Pricing



SRECs and Solar Claims Issues

- **If SRECs are sold from an on-site PV project, this limits the kind of claims that can be made about the project**

- **Federal Trade Commission's Green Guides,**
  - Revised Green Guide Issued in October 2012
  - "Marketers who generate renewable energy– say, by using sola but sell RECs for all the renewable energy they generate should they "use" renewable energy. Using the term "hosting" would be deceptive in this circumstance"
  - https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/guides-use-environmental-marketing-claims

- **Resources on Solar Claims – Center for Resource Solutions**
  - Best Practices for Public Claims for Solar PV Systems
  - http://www.green-e.org/learn_re_claims.shtml
- **Guidance for Third-Party Solar Projects – Vermont Attorney General**
  - http://www-assets.vermontlaw.edu/Assets/iee/Guidance%20on%20Solar%20Marketing%20(ID%2085283).pdf

REC Accounting Issues

- **Challenges associated with lack of guidance and standard practice in accounting for RECs**
- **Lease accounting**
  - Do REC contracts fall under lease accounting guidelines?
- **Derivative considerations**
  - Distinctions between accounting for purchase of RECs and forward contracts to buy or sell RECs
- **Asset type and accounting value**
  - Are RECs classified as “inventory” or “intangible assets”

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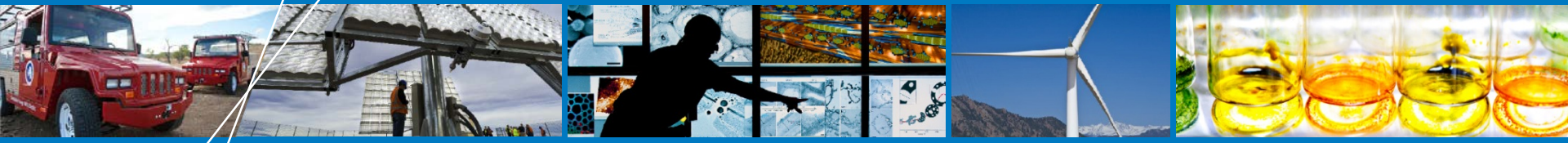


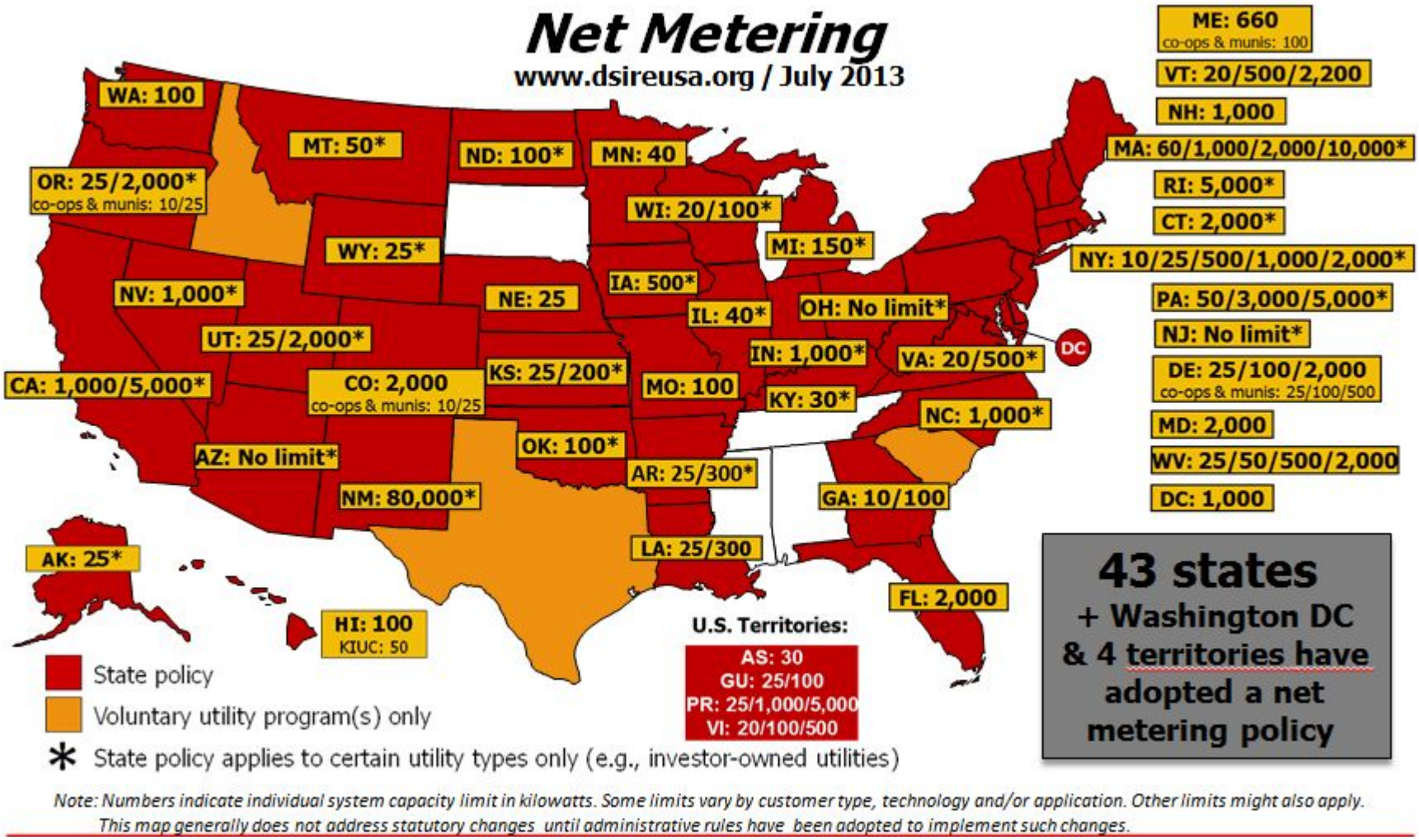
Net Metering and Interconnection

What is Net Metering?

- When a customer's generation exceeds the customer's use, electricity flows back to the grid, offsetting consumption at a different time during the same billing cycle.
- Customer uses excess generation to offset electricity otherwise purchased at the utility's retail rate.

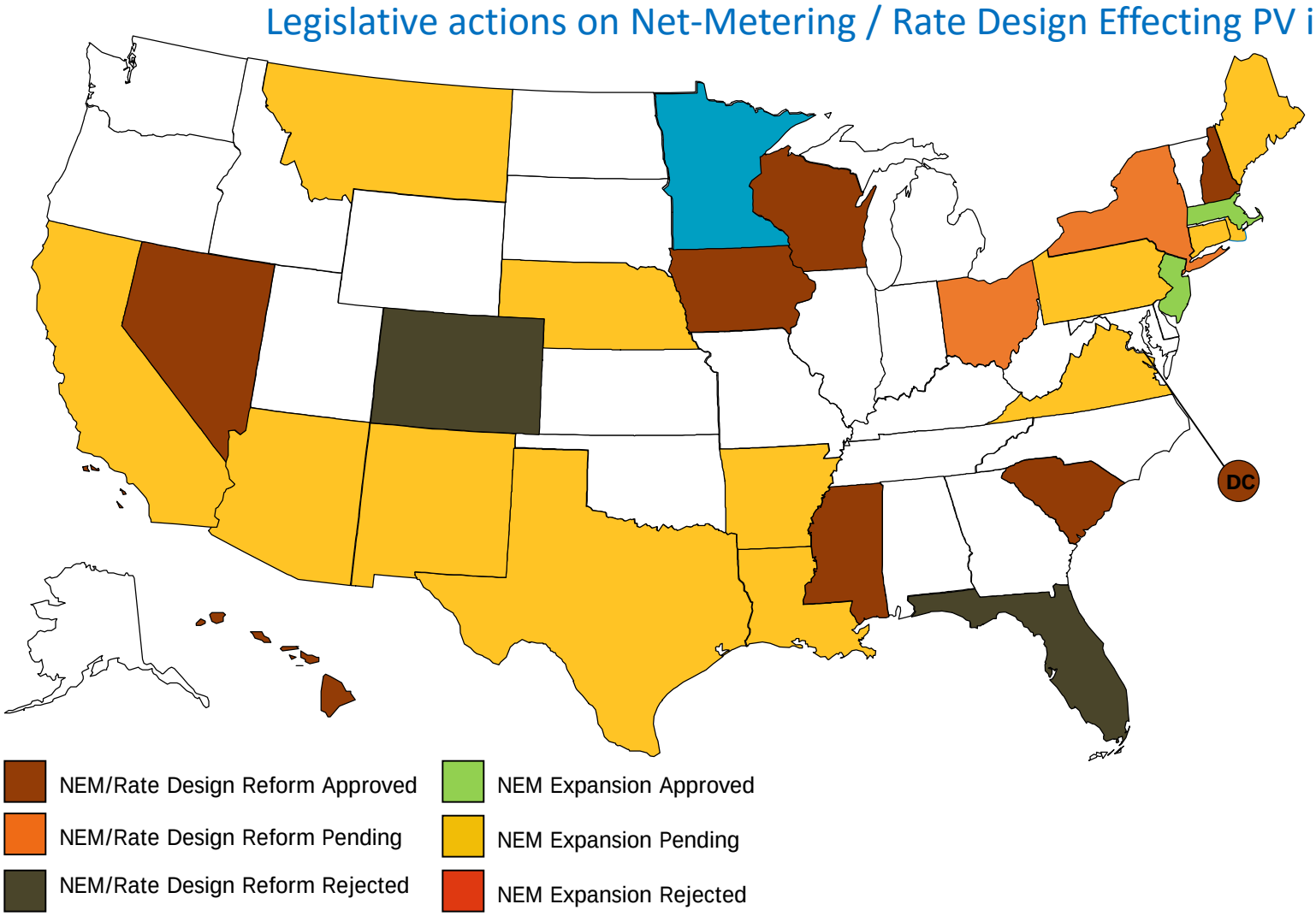
Source: Database of State Incentives for Renewables & Efficiency (DSIRE) - http://www.dsireusa.org/glossary/

Net Metering Policy Summary



Note: Numbers indicate individual system capacity limit in kilowatts. Some limits vary by customer type, technology and/or application. Other limits might also apply. This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.

Recent Legislative Action on Net Metering/Rates



Source: Meister Consultants Group, *50 States of Solar: Net Metering Quarterly Update* (Q1-Q3 2015); Utility Dive 12/15/15, 12/22/15, 12/7/15.

Net Metering Policy Components

Design Considerations

- **System size limitations**
  - Limits on size of eligible residential and commercial systems
  - Is oversizing of systems allowed?
- **Period of crediting**
  - Monthly, annual, or continuous crediting
- **Crediting of net excess generation**
  - Retail or wholesale rate
- **Cap on total net metered capacity (all systems combined)**
- **Additional fees (if any)**
- **Renewable Energy Credit (REC) ownership**
  - **Does the customer retain the RECs from the system?**

Example Net Metering Programs

Colorado

- **Net Excess Generation:**
  - Rolls month to month
  - IOUs: Customers can roll over credit indefinitely or receive payment at average hourly incremental cost at end of year
  - Municipality and co-ops: annual reconciliation at a rate they deem appropriate
- **System Capacity Limit:**
  - IOU customers: 120% of the customer's average annual consumption.
  - Municipality and co-op customers: 25 kW for non-residential; 10 kW for residential
- **Total Capacity Limit (all systems):**
  - No limit specified

New Jersey

- **Net Excess Generation:**
  - Rolls month to month; excess reconciled annually at avoided-cost rate
- **System Capacity Limit:**
  - Capacity equivalent to serve customer's annual on-site energy consumption
- **Total Capacity Limit**:
  - No limit specified (Board of Public Utilities may limit to 2.5% of peak demand)

Meter Aggregation/Virtual Net Metering

- **Meter aggregation - a renewable energy project can offset the electricity load of a customer with multiple meters**
  - Example: A solar project at a federal site offsets the loads of buildings that are separately metered

- **Virtual net metering/group billing – multiple customers receive benefits of a net-metered renewable energy (RE) project, with resulting bill credits allocated across the participating customer bills.**
  - Examples: Multiple stores in a shopping mall receive benefits from solar project on the mall roof
  - Community solar project with net metering

Meter Aggregation/Virtual Net Metering Programs

- **Examples:**
  - California, Colorado, Delaware, Massachusetts & Vermont
- **Virtual net metering/group billing**
  - Vermont: 22 groups have formed to share the output of a renewable energy system with system sizes ranging from 1.5 to 199 kW
- **California Meter Aggregation:**
  - Virtual net metering allowed for multi-tenant properties
  - Meter aggregation allowed for local governments if all participating accounts receive a time-of-use rate
  - Meter aggregation may be allowed for all customers with multiple meters on parcels of land contiguous to the location of the renewable energy system (pending public utility commission approvals)

NREL report: http://www.nrel.gov/docs/fy12osti/54570.pdf

Interconnection Standards

Technical issues

- Include safety, power quality, system impacts when connecting to grid
- Higher penetrations on feeders can result in issues such as higher voltage and concerns about backflow
- Use of screens for additional review based on feeder penetration can vary (15% of peak load, 100% of daily minimum load)

Procedures – vary by state

- Detailed studies may be required for larger systems, often >1MW
- Expedited process for systems up to 2MW-5 MW in some states
- Simplified/expedited process available for non-exporting generators up to at least 10 MW

- ***Freeing the Grid*** ***www.freeingthegrid.org***
- **A State-Level Comparison of Processes and Timelines for Distributed PV Interconnection in the U.S.**

http://www.nrel.gov/docs/fy15osti/63556.pdf

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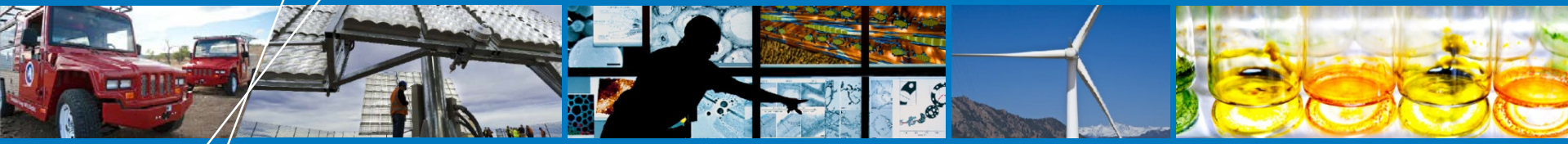

Conclusion

Steps for Universities

- Evaluate whether you can sign a third-party PPA to monetize the ITC; if not, explore other financing options
- Discuss whether to keep the SRECs from your project and the implications to your GHG accounting
- Contact your utility to find out about solar incentive programs
- Research net metering and interconnection policies through www.dsireusa.org and your utility

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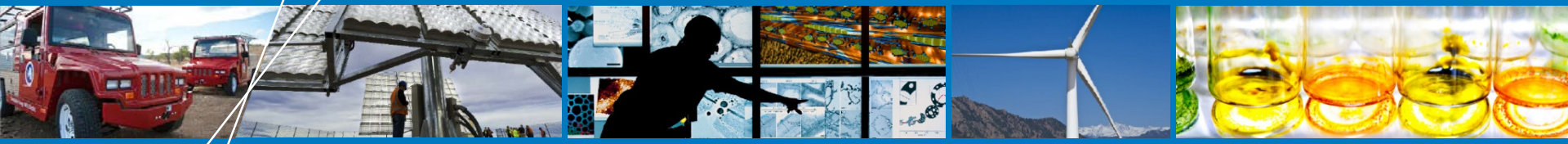

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Q&A
DISCUSSION

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Questions?

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